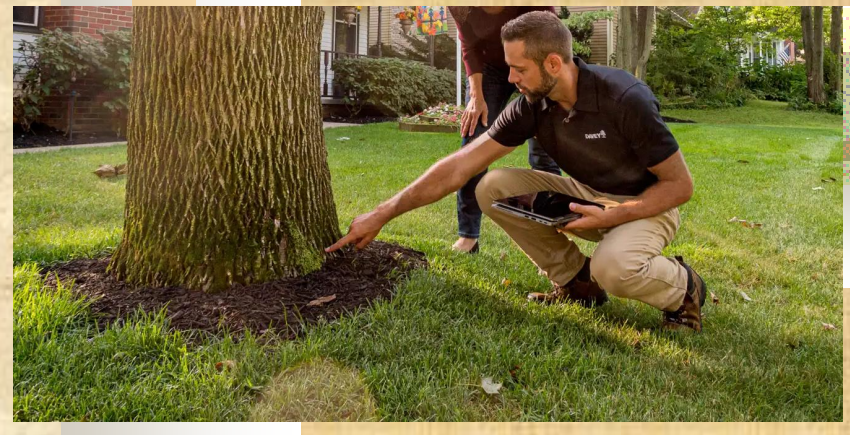
PLANT HEALTH CARE

IAA ADVANCED TRAINING PROGRAM



DEFINITION AND PHILOSOPHY

- **Plant Health Care (PHC)** – a holistic and comprehensive program to manage the health, structure, and appearance of plants in the landscape
  - Plants can not be viewed in isolation
  - The entire system must be considered
  - **Proactive approach**
  - Plant problems can be avoided by **"right plant-right place"**
  - **Challenge:** To educate both green industry professionals and clients on value and importance of PHC

Basic Ingredients of PHC

- Qualify customers with program goals
- **Conduct plant and pest inventory**
- Participate in client interaction
- Develop of a management plan
- Develop Contract
- Estimate potential problems
- Conduct monitoring and inspection
- **Treatment strategies**
- Customer reports
- Recommendations
- **Seasonal summary and evaluation**

What is a Healthy Plant?

- **Vitality** – the plant's ability to deal effectively with stress

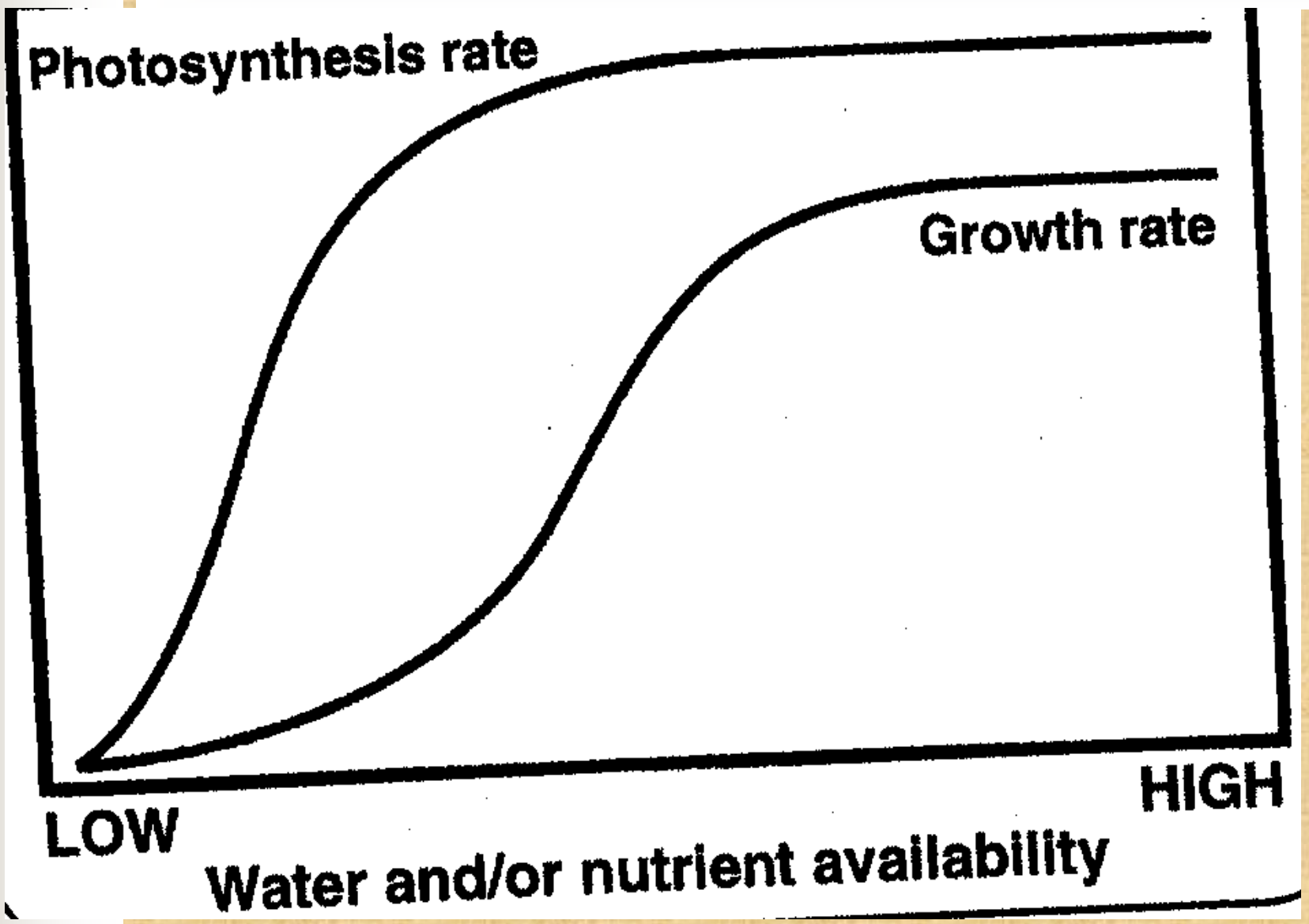
- **Vigor** – the plant's inherent genetic capacity to resist stress

- **Growth and health are not the same!!**

Plant Health and Stress

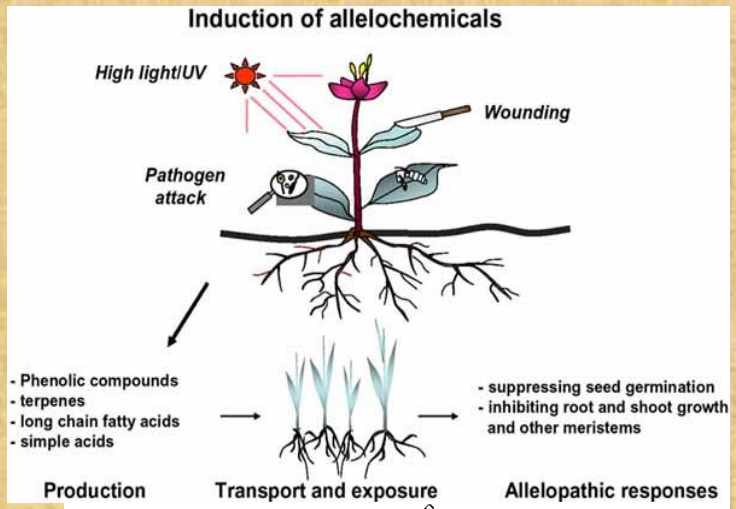
- Plant vitality includes **resource allocation**
  - Maintenance
  - Growth
  - Storage
  - Defense

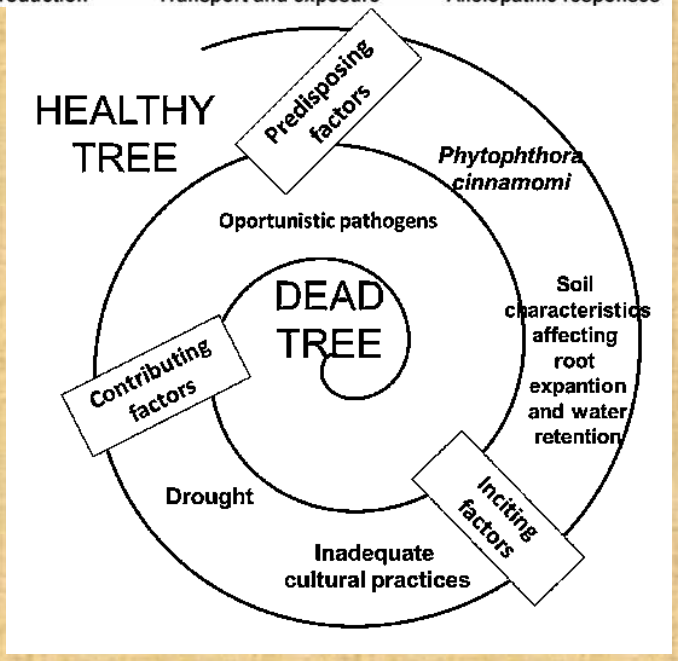
- **Stress** – any factor that limits a plant's ability to acquire resources or leads to excessive amounts of these resources
  - May reduce a plant's ability to photosynthesize
  - May actually increase drought or pest resistance


Photosynthesis rate
Growth rate
LOW
HIGH
Water and/or nutrient availability

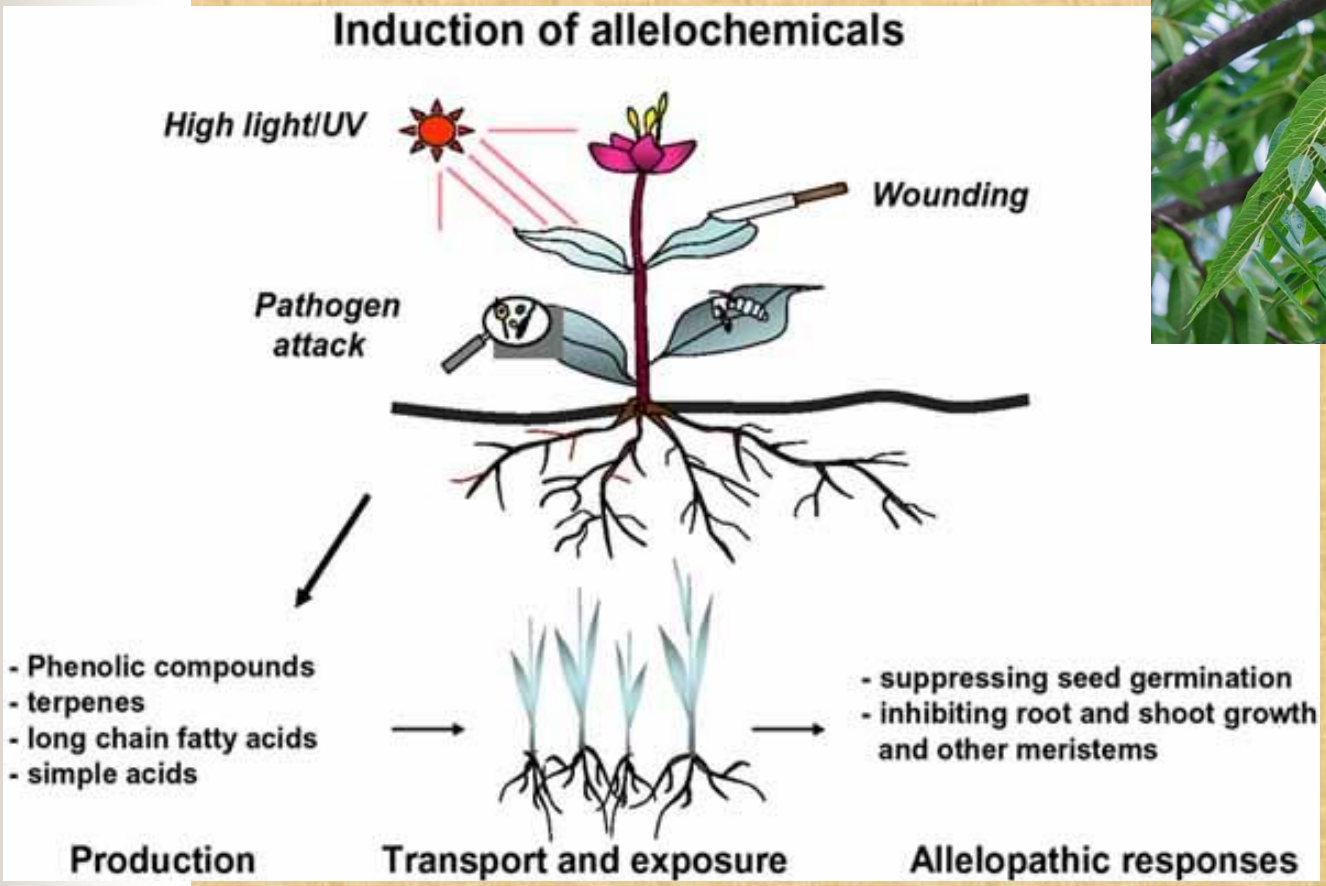
When is Stress Too Much for the Plant?

- **Moderate drought** can increase levels of **allelochemicals**
- Rapidly growing trees may be less resistant to insects and diseases
- **Stress can have a cumulative effect**
- *Multiple stresses can* compound problems and place a tree into **decline or mortality spiral**





Allelopathy



Morphological and Mechanical Protection

- Waxy leaf cuticle
- Hairs, spines and setae
- Trichomes
- Thorns

Morphological and Mechanical Protection

- Spines
- Lignification
- Leaf toughness
- Leaf thickness

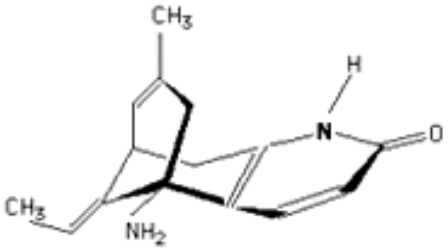
“Chemical Warfare”: Secondary Metabolites

- Not essential for plant growth, but metabolic by-products
- Occur in the **secondary metabolic pathways**
- **Derived from primary metabolites**
- Consist of terpenoids, alkaloids, anthocyanins, phenols, quinones

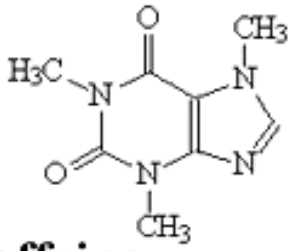
Terpenes: Hydrocarbons

- **Essential oils** (i.e. herbs, perfumes, spices, incense)
- **Resins** (i.e. adhesives, varnishes, insecticides, rosin)
- **Polyterpenes** (i.e. latex, rubber)

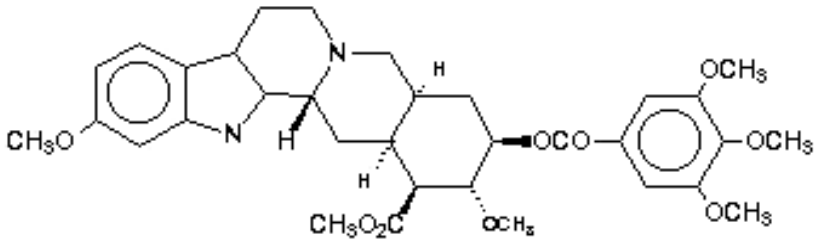
An Assortment of Alkaloids



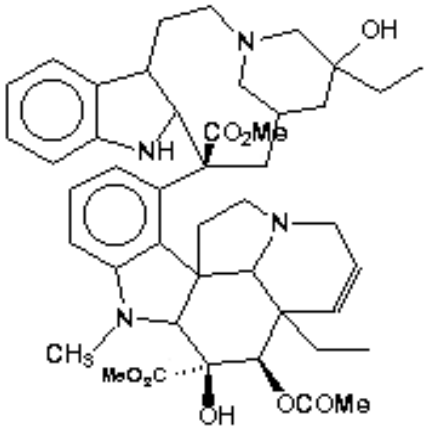
huperzine A
Chinese herbal medicine
nootropic



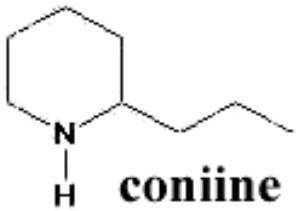
caffeine
Coffea arabica
study



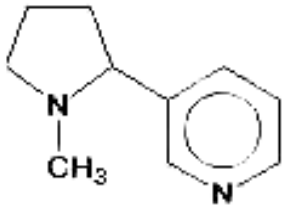
reserpine
Indian herbal medicine
antipsychotic



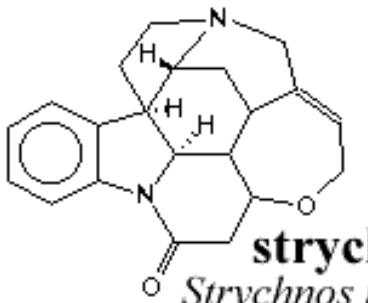
vinblastine
Madagascar periwinkle
antileukemic



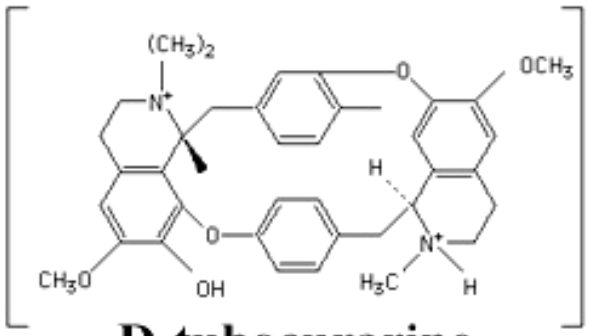
coniine
hemlock
ants, Socrates



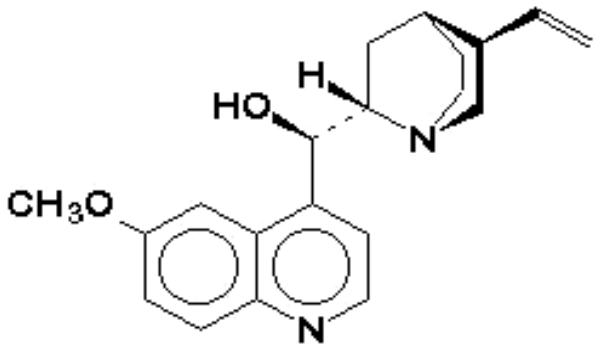
nicotine
tobacco
Black Leaf 40
insecticide



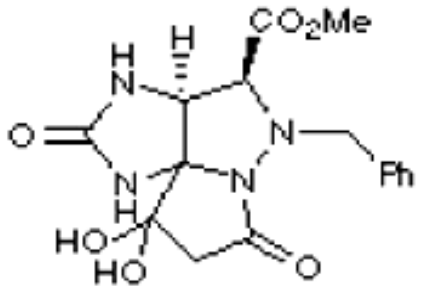
strychnine
Strychnos nux-vomica
rodenticide



D-tubocurarine
arrow poison, muscle relaxant for surgery



quinine
Cinchona tree, antimalarial

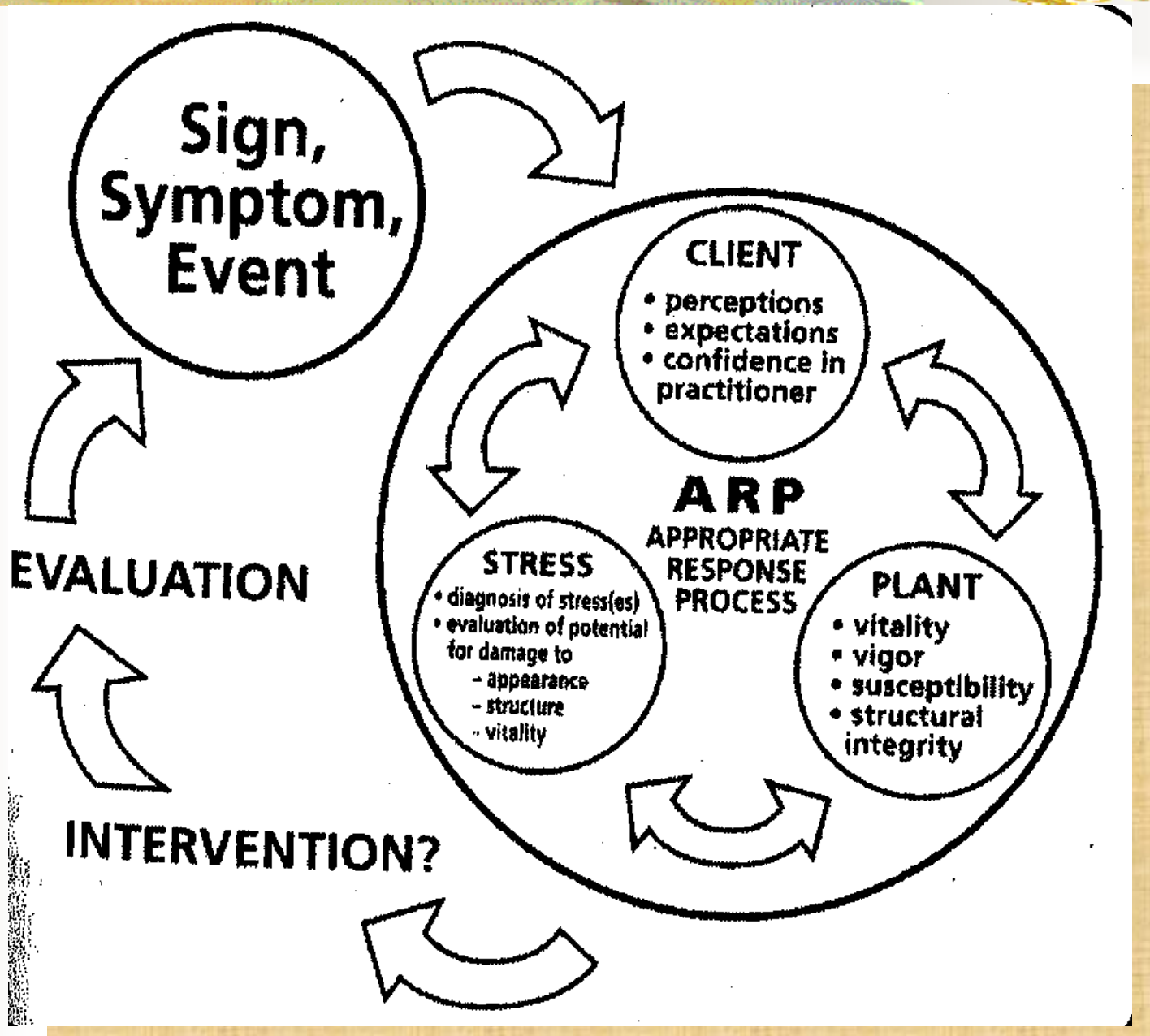


saxitoxin
deadly algal toxin
chemical warfare agent
CIA suicide pill

The PHC Process

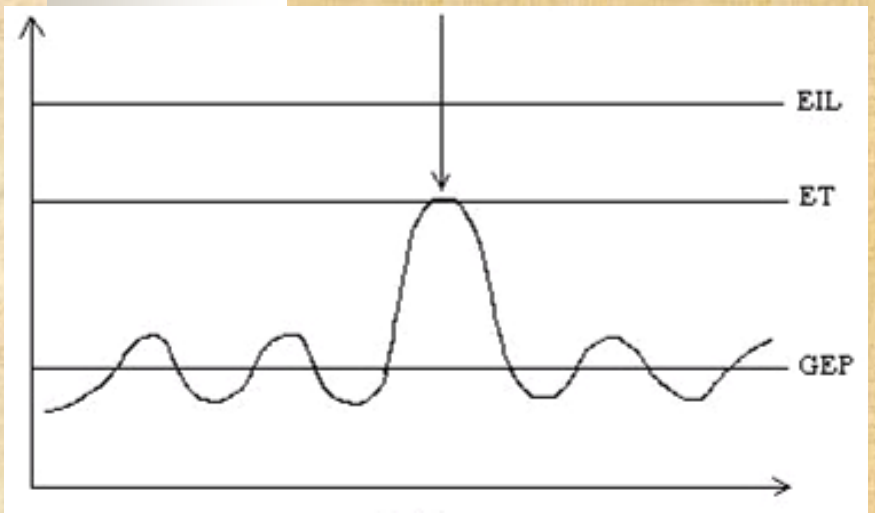
- **Monitoring –** process of observing, identifying, recording, and analyzing what happens with plants in the landscape

- **Appropriate response process (ARP)**
  - Process of gathering information, assessing the severity, and implications of the problem
  - Determining client expectations
  - Deciding on a course of action


Sign, Symptom, Event
CLIENT
• perceptions
• expectations
• confidence in practitioner
ARP
APPROPRIATE RESPONSE PROCESS
STRESS
• diagnosis of stress(es)
• evaluation of potential for damage to
– appearance
– structure
– vitality
PLANT
• vitality
• vigor
• susceptibility
• structural integrity
EVALUATION
INTERVENTION?

The PHC Process

- **Action Threshold**-the intensity of pest population that threatens the health or vitality, and longevity of a plant
- **Aesthetic Threshold**-the highest level of pest habitation or damage that is acceptable to most people in an affected area



Action Thresholds for Cankerworms

Regina, Saskatchewan, Canada

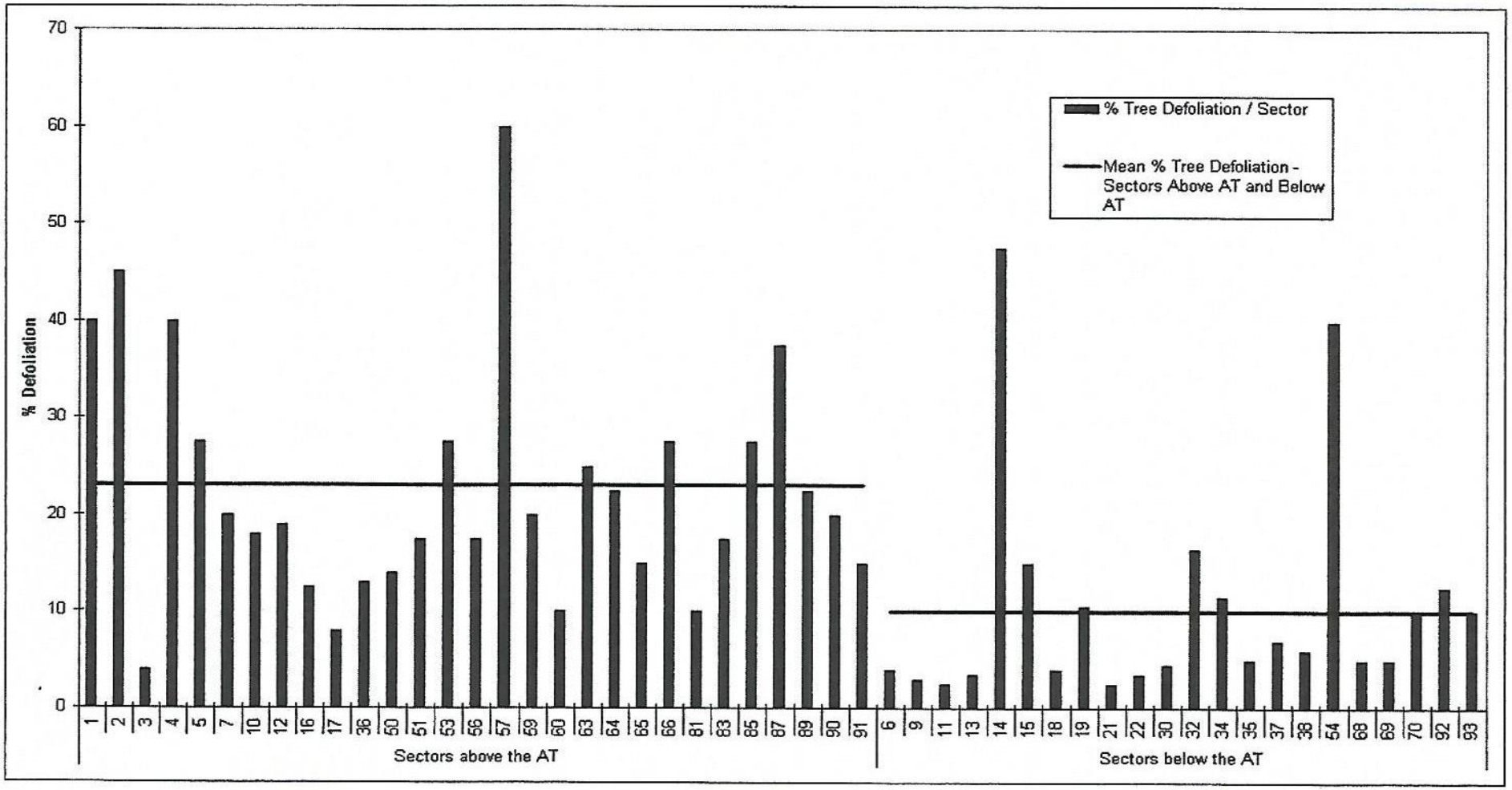
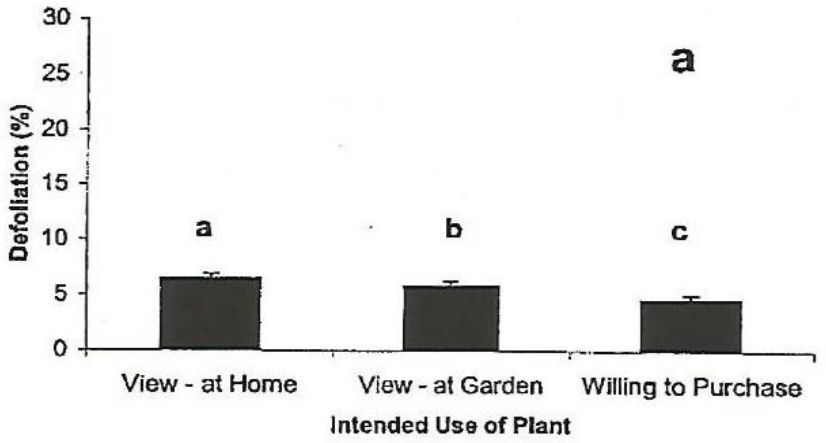


Figure 5. Percent tree canopy defoliation per sector shown with the respective means of sectors above and below the action threshold.

Tolerance to Injury on Canna Lilies and Chrysanthemum Flowers (Sadof and Sclar, 2002)



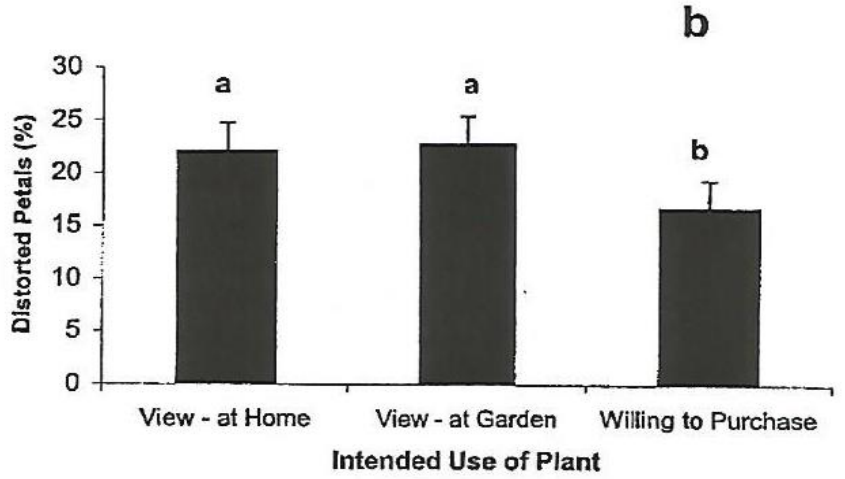


Fig. 1. Effects of intended use on the maximum tolerance of Longwood Gardens visitors to (a) Japanese beetle defoliation on Mrs. P. S. DuPont canna lilies, and (b) western flower thrips injury on Bola de Oro and Coral Pomona chrysanthemum flowers. Bars represent means, and vertical lines represent standard errors of the mean. Mean bars labeled with the same letter are not significantly different according to a Fisher protected LSD test ($P < 0.05$).

Suggested Treatment Thresholds for Pest Groups

PEST GROUP	TREATMENT THRESHOLD
Sawflies	25% of branches infested
Leafminers	50% of leaves infested
Scales	5 mature females/branch
Twig/shoot feeders	25% of tree damaged
Twig galls	15% of branches infested

PHC Tactics

- Host Plant Resistance
- Cultural methods or “Good Arboriculture”
- Sanitation
- Chemical pesticides

PHC Tactics

- **“Biorationals” or “Environmentally Friendly”**
  - Insecticidal soap
  - Horticultural oil
  - Botanicals
  - Insect growth regulators (IGR’s)
  - Microbials

- **Biological control (BC)**

- **Physical control (Weather)**
- **Mechanical control (Exclusion)**

"When Things Go South"

- **Pest resurgence –** the resurgence of a pest population brought on by use of broad-spectrum insecticides that eliminate natural enemies or other control agents

- **Secondary pest outbreak –** increase in the population of an insect that is normally not a pest, but becomes a pest because of the elimination of natural enemies or other control agents

Pest Resurgence

What does Resurgence and Resistance look like?

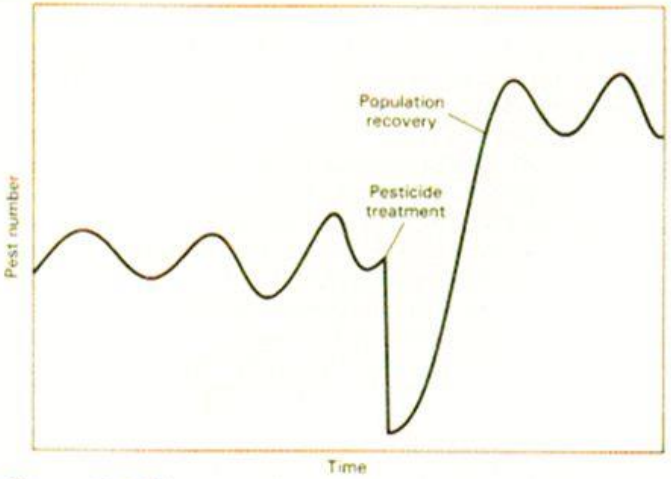


Figure 16.8 Diagrammatic representation of insect numbers as they would respond during pest resurgence. Note that numbers are higher after population recovery than before treatment.

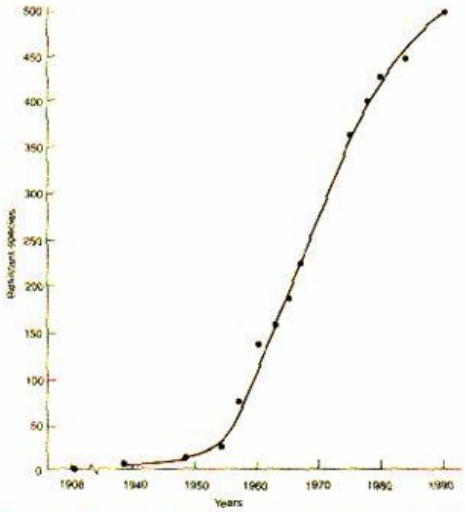
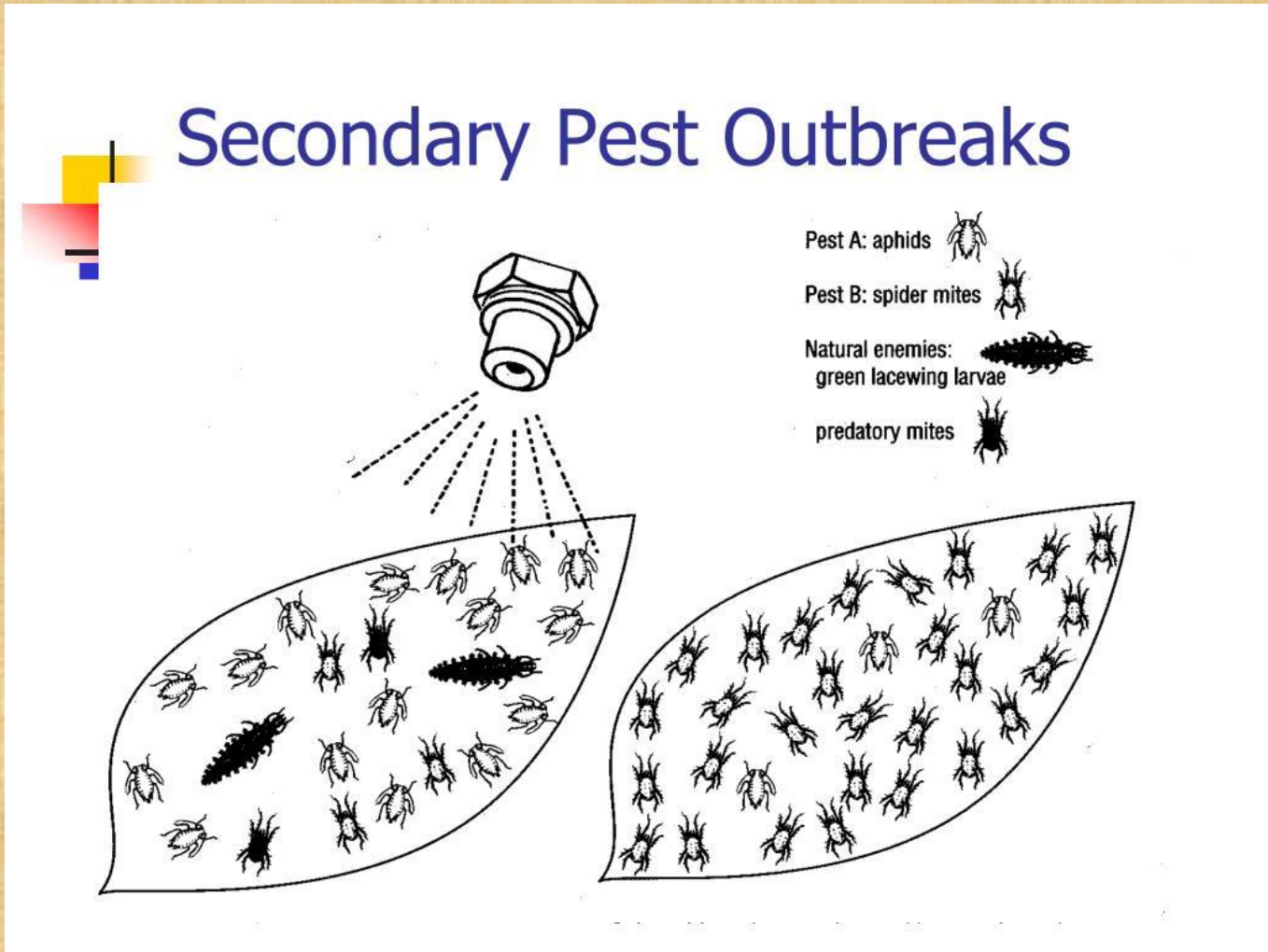


Figure 16.3 Historical development of insecticide resistance worldwide. (Redrawn, with updates, from Georghiou, 1986, *Pesticide Resistance: Strategies and Tactics for Management*, Courtesy National Academy of Sciences)

Secondary Pest Outbreaks

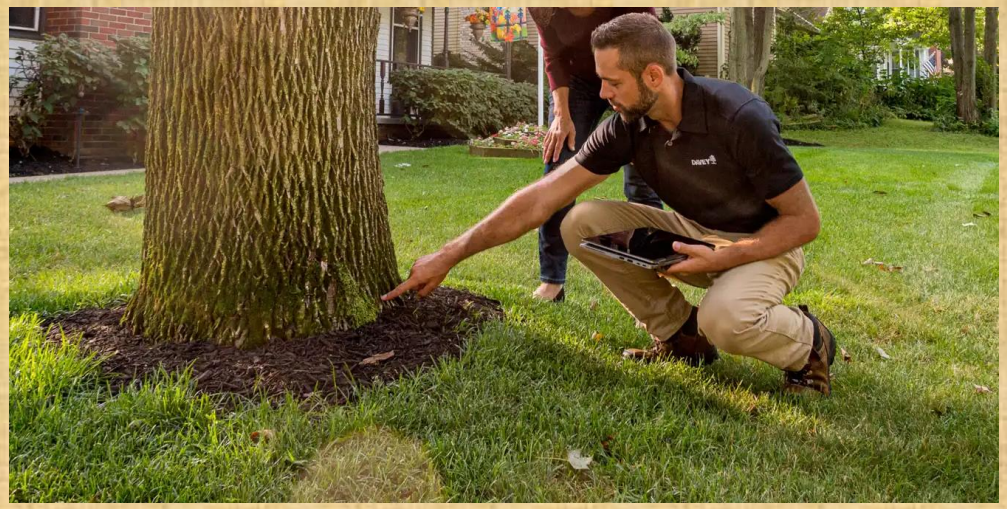


Who are Tree Care Consumers??

- Tend to be older
- More highly educated
- Own a home
- Live longer in the home
- Many mature trees on the property
- More affluent
- Desire tree care information

Tree Care Customer Profiles

- **Contact** driven
- **Aesthetically** driven
- **Information** driven



Contact Driven Customers

- Environmentally responsible
- Status conscious (often new homeowners)
- Trees represent history and wealth
- Property is an investment
- Service and treatment must have immediate effects
- Pests must be eradicated (all pests)
- **Selling points: proven results, promises of effects**

Aesthetically Driven Customers

- Environmentally indifferent
- Service conscious
- Trees are a resource or commodity
- Trees are self sustaining
- Caretaker view of landscape
- Arborist must stand behind service
- Pest problems are arborist's concern
- **Selling points: professionalism and service**

Information Driven Customers

- Environmentally concerned
- Price conscious
- Tree are symbolic or social values
- Landscape is a complex living system
- Guarantee of work is essential
- High pest tolerance
- **Selling points: credibility and price**

REMEMBER, IT WILL BE COMPLICATED!!!

Summary

- Definition and philosophy of Plant Health Care
- Ingredients of Plant Health Care
- What is a healthy plant?
- Plant defense mechanisms
- The PHC Process
- Treatment options
- Tree care customer profiles

END OF PRESENTATION